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## REPORT ON EXPLORATIONS IN NORTH- ERN MEXICO.

BY

CARL LUMHOLTZ.

After having visited the Zuñi, Moqui and Navajo Indians of Arizona I last summer proceeded to the City of Mexico in order to make the necessary arrangements with the Mexican Government, with regard to my intended explorations of the Sierra Madre. The way had been prepared for me in Mexico by the kind offices of the Secretary of State, Mr. Blaine. President Diaz and all the members of his Cabinet afforded me every imaginable facility and support. Orders were given to pass my baggage and supplies free of duty and to furnish a military escort whenever needed, and I was further provided with letters of recommendation to prominent persons in Northern Mexico. I then returned to the United States to organize the expedition. Tremendous floods in the southern part of New Mexico and Arizona retarded my work for about a fortnight, but at last in the beginning of September, 1890, I was able to make a start from Bisbee, Arizona, for Sonora, Mexico, travelling in a southerly direction.

The main object of my expedition, which I have the honor to conduct under the auspices of the American Geographical Society and the American Museum of

Natural History, is to make researches into the ethnology and archæology of Northern Mexico. The Sierra Madre, the broad mountain chain that stretches from the United States through a great part of Mexico, has in its northern part never been scientifically explored.

This region, the continuation of the Rocky Mountains, offers a wide field for scientific exploration, now that the reduction of the fierce Apaches to submission by General Crook, in 1883, has opened the country to peaceable men, the present expedition being the first to take advantage of this change. Small bands of Apaches are still left there, and others are constantly breaking away from the San Carlos Reservation. The Mexican knowledge of these mountains may be thus briefly-summed up : that it is a tremendous mountain country and difficult of approach. It would sometimes take eight days to reach the top of one ridge. There are, besides, great pine forests alive with deer and bears, wonderfully large woodpeckers that are able to cut down whole trees, plenty of remains of long ago vanished people who lived in towns and tilled the soil, and built monuments and even bridges over some of the cañons.

A story is told by an American, who had lived among the Apaches for a number of years, of a beautiful and fertile valley, which showed traces of a former dense population in the ruins which remained, and the great number of planted fruit trees still bearing fruit. There were once worked in this wild part of the Sierra two famous mines, the location of which is now lost. They are said to have been the property of the Jesuits, who, before

their expulsion from Mexico, held nearly all the mines in the country. The tradition says that the Apaches killed every soul in the two mines of Vainopa and Tayopa, and so they were forgotten until recent times, when people studying the old church books and other early Spanish documents discovered the record of their existence. Several expeditions have been sent out, one, I believe, by the Government, but in vain. Being situated in a very rough country, these mines are still awaiting their re-discoverer, and the Governor of Chihuahua, who told me much about them, felt very sanguine that I was to be the lucky one to find them, encouraging me by saying that if I found Tayopa it would be worth fifty million dollars. More than the prospect of riches, to which I am not indifferent, my zeal for science is stimulated by the hope of meeting in the Sierra Madre with people who are living to-day as they were before the coming of the Spaniards.

I have reason to believe that in the rugged fastnesses of these almost unknown regions there may dwell tribes who are in the most primitive state of culture, even to the extent of dwelling in cliffs and caves. The old church books of Bacadehuachy tell us, says Mr. F. A. Bandelier, of the Jesuits going out in the mountains to administer the sacrament to the Tarahumari Indian who were living in caves and cliffs. But I am convinced that many of this same tribe are still living in that way ; there may be others. What light might one not hope to throw on the early development of the American race by a close study of the culture, manners and mode of life of such primitive people !

I had with me a party of scientists and assistants, rep-

resenting archæology, botany, zoology, mineralogy and geology.\* Prof. W. Libbey, Jr., of Princeton, N. J., took part as the physical geographer of the expedition, bringing with him his laboratory man. We were fully provided with a photographic camera, two kodaks, one detective camera, assaying outfit, anthropometric, meteorological and geodetic instruments, etc.

As we left the dreary plains of Arizona behind us we entered upon a more pleasing country, where the hills sloped to the sparkling streams, that ran between banks lined with the wild grape vines, the cotton-wood and other trees, and the landscape was fresh and green after the heavy rains.

Among flowers is noticeable on the river banks the exquisite, gorgeous, white *Datura Metalloides*. Its crown is six inches long and four inches broad. We saw one cluster of this creeping plant fifty feet in circumference. It is well known on account of the disfavor with which it is regarded by the better class of the Navajos, the root being employed as an aphrodisiac, and its use often resulting in madness or death. The effect of the poison is cumulative, and the Indians under its influence are like Malays running amuck and trying to kill all they meet.

A plant of the cucurbitaceæ was the *Lagenaria*, with its carrot-like root, six feet in length, used here as soap. Among birds the most numerous were flycatchers and doves.

The first pueblo passed was Fronteras, once the scene of many desperate encounters with the Apaches.

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\* Messrs. R. Abbott, G. Haviland, A. M. Stephens, C. V. Hartman, F. Lloyd, F. Robinette and H. White.

Here I dug out eight valuable Apache skulls from a well, into which a number of men and women had been treacherously thrown by the Mexicans.

Passing Cochuta to the south, we met with an extensive stratum of fossils, but had no time to make any excavations. Several gigantic animals have been washed out here by floods and carried off. Many signs of former habitation appear in the neighborhood in the form of ruined pueblos. In one of these we saw stones arranged in a parallelogram measuring fifty feet long and half as many wide. No built wall was underlying these surface stones; and sometimes they are set in a circle. A lot of broken pottery and arrowheads we gathered in the ruins, with which the whole country abounds. Gold and coal were found in this district in considerable quantity, but yet not enough to make them an object for mining.

Some forty miles south of Cochuta I turned in a southeasterly direction and climbed a hilly plateau, 3,200 feet above sea level. The geological formation was still volcanic and metamorphic rock. Here we found the first orchids, yellow in color and deliciously fragrant, and in the cañons below we saw the first palms. We then descended to the Bavispe River, a name here given to the upper part of the Yaqui. It is worthy of remark that the Mexicans designate the same river by different names in different parts of its course.

We followed the river to the south, passing Ópata, Guasabas and Granados.

The country was fertile but dry, and the heat was great. Even at the end of October the thermometer marked nearly 100° Fahr. in the shade. There were

fields of sugar cane, and in the orchards grew orange trees, figs and lime trees in abundance. Grass had become dry and scarce, and it was difficult to keep our animals in condition.

The Mexicans of Eastern Sonora are here not easily to be distinguished from the Ópata Indians. In the different pueblos on the Bavispe our large party, with the animals and baggage, created quite a sensation among these people and roused them from the routine of their uneventful daily life. Every day they came to consult me for their ailments, and it was of no use to tell them that I was not a medical man and that I could not give them remedies. They would have me feel their pulse, and tell them what was the matter with them, how long they were going to live, etc. A great many of them were suffering from indigestion. There were a number of deaf and dumb persons among them, the result of their constant intermarriage; there were cases of epilepsy, also, and some of insanity.

A curious case of a man coming very near to being killed by the maggots of the blue screw-fly came to my notice. He was a soldier, who once in a fight had got his nose cut off, his nostrils thereby becoming entirely exposed. One night when he was drunk the screw-fly laid its eggs in his nose, and when these were hatched it seemed as if he was to be eaten up alive. I gave the man some relief by syringing the place with a solution of corrosive sublimate, but an intelligent Mexican, who had an extensive knowledge of native medicinal plants, with which the country abounds, many of them no doubt very valuable, treated the patient and in two days he seemed to be in a fair way of saving the poor wretch.

Several of my mules and donkeys were attacked in the same way by maggots in sore places, and it was exceedingly difficult to free the poor animals of this disgusting plague.

I was assured that there never had been a thief known in this place. However that may be, one thing is certain, that the Mexicans of Eastern Sonora are a nice class of people. They are pleasant to deal with, very active and obedient, and I never wish for better men than I have at present in my camp, nearly all of them being from these parts. The influential men, one or two in each town, are very obliging, and they tried to help me in many ways. People are ignorant, for instance, and do not believe in checks except when they are green! But I was always helped out by some comparatively rich man, who knew more than the others, and assisted me to cash the checks, going with me from house to house collecting together all the cash in town.

Near Granados are three extensive pueblos in ruins. There are also some interesting petroglyphs only two and a half miles north-west from town. The designs were rudely picked on a moderately smooth felsite rock, about forty feet above the bed of the valley. Some of the figures represent evidently the *patolachi* or deified dragon-fly found almost universally among the ruins of Arizona and Northern Mexico. The significance of the designs to the modern village Indians is the wind deity, beneficent in distributing the winds. There were also found the concentric circles, the conventionalized spiral and the meander design so common among the northern Indians, and still in use among the Moquis. All the figures of the deities are drawn in the characteristic



style that we find in the north, their hands and feet defined with three radiating lines like a bird track.

We were now in the beginning of November. I had of late suffered considerable losses and annoyance by having my convoy of supplies stopped at a frontier custom house. The Mexican Government showed me, however, their good will by punishing very severely the inspector, who caused me this trouble, for going beyond his orders.

From Granados we took a more easterly course, at last being able to cross the Bavispe River, which for some time had been in flood on account of heavy rains. The country now gradually rose, and after a fortnight's march through mesquites and oaks we reached Nacory, a small, poor town at the foot of the Sierra Madre. Bacadehuachy, which we pass on our way, has a cathedral, built of adobe, but vast and extremely massive.

In this region Mr. Hartman, our botanist, found a new species of agave, which is strikingly beautiful, with delicate stripes of white, running in concentric circles on the rosette of lanceolate leaves, that constitute the plant. The flower stalk is 12 to 13 feet high.

Near Nacory we spent some time making excursions in the neighborhood and preparing for the crossing of the Sierra Madre, whose mighty ranges spread themselves before us one after the other like so many impassable barriers.

Through the inhabitants of the little hamlet I found out, that there are several deposits of fossils, or *huesos gigantes*, as they are called in these parts of the world, people imagining that the large fossils are remains of

giants. In one valley, 6 miles south of Nacory, is a bed of clay  $1\frac{1}{2}$  miles long and 30 feet deep, and in the edge of the bed Mr. White found what he took to be a horn, 6 feet 8 inches long, and 26 inches around at its greatest circumference. It was not petrified, and in color it was a rich mahogany brown. It had no bone core, the hollow being filled with clay. Prof. O. C. Marsh, to whom I have given the measurements but no sample of the find, thinks it to be the tusk of a mammoth. Thus it would be the first time that this animal was found so far south.

After having received some supplementary provisions from Granados, I at last on the 2d December began the ascent of the Sierra Madre with a party of 30 men (including the scientific corps) and about 70 pack mules and burros. There are four great Sierras to cross, at an elevation varying from 8,000 to 9,000 feet, and the country, as may be imagined, is at times extremely rough. We made our own trails, 4 men going 2 or 3 days ahead of the main body, sometimes guided by Apache tracks. I had the trails cut zig-zag instead of the Mexican way of going straight up like a goat, and to this I attribute being at all able to pull through, as it saved the animals enormously. In some places our pack animals had to be led one by one alongside of yawning abysses. Many a time the beasts lost their balance and rolled down the mountain sides.

The Mexicans appeared quite accustomed to such accidents, and in fact they seemed to be in the regular line of Mexican travel. Strange to say, I never lost one animal that way, but, from December to February, 13 died from exhaustion or sickness caused by the cold.

weather and the poor quality of grass. Several times we had snow, once, in January, 7 inches deep, the coldest night (10 January) showing a temperature of 6° F. Christmas day the black bulb thermometer showed in the sun 150° F., while at night the temperature had been 22°, a difference of nearly 130 degrees. Even a rattlesnake was that day brought out by the heat. Water and grass were plentiful, but the grass was of poor quality.

The landscape was magnificently wild with high towering mountains and deep chasms, or again a seemingly infinite succession of ridges and plateaus, covered with pine trees never touched by an axe. The steep slopes in the valleys and crevasses are covered with slippery pine needles 8 or 12 inches long, while the pines tower up to a height of 100 feet; the forests have a remarkably young and fresh look about them; now and then on exposed places we met with trees split like matches, telling us what terrific winds sometimes may blow over these solitary regions.

In the cañons at an elevation of 6,000 feet Resurrection plants (*selaginella sempervivens*) cover the damp rocks and shady cliffs like a mat. Six or eight species of ferns, among them the beautiful maiden-hair fern, are also found, and the maples with their autumn coloring carried the Americans back to home.

*Helianthus* was on the 4th of December found growing in these cañons, while elders were observed with leaves and flowers at the same time. *Bambusa* forms here frequently a thick light green undergrowth of beautiful contrast to the dark shades of oak, elder and palms. A species of *salvia* with deep scarlet flowers is

very striking. At an elevation of 8,900 feet, the highest reached on our route, was found a species of violet, a *lupinus* and a *vicia* (the latter two yielding an excellent fodder for cattle). Piñon trees and strawberry trees (*arbutus texana*) are frequently met with.

In the western parts of the Sierra Madre we found game scarce, as, for instance, in the country around the Bavispe River, but near the *mesas* and *cordones* the forests were alive with deer. Also turkeys were plentiful, but only one bear was observed. In the Gabianas River, a northeasterly tributary of the Bavispe, the fish were found in numerous quantities in all the water pools, it being just the time for their spawning (January); they were big suckers and trout, of excellent quality and very fat.

Among birds must be mentioned *campephilus imperialis*. This magnificent bird, which is 21 inches long and is therefore the largest woodpecker on the globe, was seen several times. They go in pairs, are not very shy, but cannot be killed except by the rifle. It is peculiar to them that they will feed for one or two weeks on one tree, so that in many cases the trees fall down. I brought back several specimens of this bird, which is extremely rare in the museums.

This Sierra Madre region is very rich in remains of a long ago vanished race of people, of whom history as yet knows nothing. Deserted pueblos containing square stone houses are frequently met with. They are generally found on top of the hills and mountains, and are sometimes surrounded by fortifications in the shape of stone walls. Isolated houses made of stone and clay and plastered, so that they look white at a distance, are also

found, and the Mexicans call them *casas blancas*. The most interesting remains are, however, in the caves, which contain groups of houses, sometimes three stories high.

*Trincheras*, or stone terraces, are built across nearly every little valley, ten to twenty in number in some of them, evidently for agricultural purposes. On very steep mountain sides these terraces were astonishing structures, fifteen and even twenty feet high, and of great solid stones, in the cyclopean style of masonry. They were met with even at an elevation of 7,400 feet. In one place eight terraces were built within a space of 150 feet, the aborigines having gained by the enormous labor expended only 3,500 square feet, or in other words making room for 500 or 600 hills of maize.

On the 23d of January we reached the first settlement on the eastern side of the Sierra Madre, a Mormon colony called Pacheco, which had been three months without mail. From here I sent most of my poor animals to the Hacienda de San Diego, where an American, Mr. Galvin, received us very kindly, while I myself with a party of twelve explored the upper part of the Piedras Verdes river valley for six weeks longer. We had had a rather laborious journey across the Sierra, and the animals were losing strength on the poor quality of grass and the cold of the nights, and they were beginning to give out. It became necessary to lighten their load by leaving half of the baggage, to be sent for a week or two later; and this made our progress slow and laborious. We had also been on reduced rations, with a scarcity of flour, and no other meat than that we could shoot for ourselves. These incidents, however annoying, form no

great obstacle to real explorers, if only the results of their toil are satisfactory.

The most remarkable caves we met with were at the head of Piedras Verdes river, 6,850 feet above sea level. These caves contain groups of houses or small villages, and the houses are splendidly made of porphyry pulp, and show that the inhabitants had obtained a comparatively high culture. The dwellings were sometimes three stories in height, with small windows, and doors made in the form of a cross; and occasionally there were stone staircases. A very remarkable feature of these structures is that the walls, which are about  $1\frac{1}{2}$  feet thick, present a solid surface of as much as eight feet in height, all of one piece and whitewashed. The finds showed that these people cultivated maize, beans and cotton, and knew the use of indigo. There were seeds of two kinds of gourds, datems and palm seeds. A hunting stick like the boomerang of the Moquis, an arrow, a complete fire drill, bone needles, baskets, mats and threads of hair and plant fibre, sandals, and pottery were among the finds.

The caves, which number about fifty in a stretch of twenty miles, are from 100 to 200 feet above the bottom of the cañon, and the largest is some fifty feet high. At the entrance of one of the cave villages we were astonished to come upon a huge vessel made like an *olla* or water jar, twelve feet high and twelve feet in diameter. The sides of it were eight inches in thickness and as hard as cement, the frame being made of straw ropes, coiled and plastered outside and inside with porphyry pulp. At the bottom was a three feet high entrance, through which a person could crawl in; the top,

which was only three feet wide, was also open. It made a marvellous impression, looking at a distance like a huge balloon, and seen near by it was as fresh as if made a week before. I believe it was for the storage of maize. In one of the other caves we met with three ruins of similar but smaller vessels, their circular bases only being left. There were built also some reservoirs for grain, dug down in the bottom of the caves. In the background of this cave, which in its looks reminded us of a cider factory, were the houses built in complete darkness. In the deepest caves the houses were built at the entrance, while in the smaller ones the houses were found at the back. It is to be noted that all the caves are natural.

We could see that the Apaches had occupied some of these caves, having left their pictures on the walls. There were also other pictures of comparatively recent origin. But the houses must be old, as we found on one thirteen coatings of whitewash.

One series of caves on the shady side of the cañon had been reserved for burial places. Here at a depth of three feet I dug out a number of bodies in a wonderful state of preservation, the saltpetre, which is mixed with the disintegrated rock, having for centuries preserved them so as to look like mummies. Several of them had their features, hair and eyebrows perfect; and these were photographed. The hair is very slightly wavy and softer than that of the ordinary Indian, almost silky in fact. They were small people and reminded us in appearance strikingly of the present Moqui Village Indians. The Moquis have, like the Zuñis, a tradition that they came from the south.

The bodies were lying in rows, on their left side with the knees drawn up, and facing the sunset. Round their loins were wrapped three layers of cotton cloth and mats. Turkey feathers and feathers of the great woodpecker, mixed with cotton wadding, were found between their legs. There were no ornaments of metal, but ornamental shells and fine straw bracelets around their ankles and wrists which fell to dust on being touched, and belts of straw were found on the bodies, while near their heads invariably stood one or two *ollas* (water jars). We found with one body a bundle of "devil's claws" (*Martynia*). These are used by the Mexicans of to-day for mending broken pottery. They drill holes through the pieces and pass into them one of these claws, just as we should a rivet. The claw is elastic and strong, and serves the purpose very well.

We spent six weeks on the Piedras Verdes, where of late years some Mormon settlements have been made. They seem to be doing well, but they complain of the climate and the difficulty of raising crops; and they are gradually retreating to the plains at the foot of the Sierra, where they have prosperous communities in the fertile Casas Grandes valley. They are making explorations in a southerly direction in the mountains.

The country here also abounds in mounds, some of them monstrously large. Here would be a fine field for investigation and excavation for many years to come. With my limited force of men I could not make as extensive excavations as I wanted, but still a very considerable amount of work has been and is still being done. We have unearthed a great many polished stone implements, about 300 jars, most of them decorated



and some in very odd shapes, and several specimens of a big stone wheel and a stone cylinder fitting into it, probably used for some sort of game.

The mounds contain houses, and, as usual, most of the relics are found near the dead bodies, which are always buried under the floor, partly under the wall. These people must have been there previous to the cave and cliff dwellers, but who they were it would not yet be safe to say.

It would be premature to express any opinion as regards the antiquity of races or the people that once inhabited the now solitary regions of the great Sierra Madre district. I am just in the midst of my explorations. I have at present fourteen men in the camp, which is ten miles south of Casas Grandes, the mineralogist, Mr. H. White, being in charge during my absence ; they are occupied with excavating a large mound close to the camp and also in collecting plants and birds. I have picked men, a most complete outfit of scientific apparatus, and all things necessary for an exploration of this kind, and everything is in readiness for a start again as soon as I return.

It is my ardent desire to continue these explorations, now just successfully commenced, for two years more, and I am glad to believe that I may rely upon the continued co-operation of the two learned Societies, under whose auspices these operations are conducted, which cannot fail to be of the utmost importance for the early history of this continent, as well as for the physical and biological conditions of that part of the country. My intention is to investigate accurately the language, habits and customs of the primitive people of the Sierra

Madre by living with them as I did with the natives of Australia, and I am sure that interesting results may be looked for in this virgin soil, in ethnology and archæology, as well as in other branches.

I have shipped over thirty cases of collections to Bisbee, Arizona, filled with objects of archæological, anthropological, ethnological and zoological, botanical and mineralogical interest. Over 400 photographs have been taken, and topographical and meteorological work has been done.